Quantile regression in varying-coefficient models under length-biased sampling with right censoring

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The analysis of length-biased data has been an area of intense research efforts in recent years. Most existing studies adopt the accelerated failure time or proportional hazards models as the basis of study, and the overwhelming majority of this work assumes independence between the censoring variable and covariates. In this paper, we propose a varying-coefficient quantile regression approach to model length-biased data. Our approach does not only allow the direct estimation of the conditional quantiles of survival times based on a flexible model structure, but also has the important appeal of permitting dependence between the censoring variable and the covariates. We develop local linear estimators of the coefficients using a local inverse probability weighted estimating equation approach, and examine these estimators' asymptotic properties. Moreover, we show that our method can be further improved when implemented within a composite quantile regression framework. A resampling method is developed for computing the covariance of estimators. The small sample properties of the proposed methods are investigated in a simulation study, and a real data example illustrates the application of the methods in practice.

Key words: Composite quantile regression, estimating equation, local linear, prevalent cohort